

High-Power Pulsed Magnetically Enhanced Plasma Processing

Abstract of Disclosure

Magnetically enhanced plasma processing methods and apparatus are described. A magnetically enhanced plasma processing apparatus according to the present invention includes an anode and a cathode that is positioned adjacent to the anode. An ionization source generates a weakly-ionized plasma proximate to the cathode. A magnet is positioned to generate a magnetic field proximate to the weakly-ionized plasma. The magnetic field substantially traps electrons in the weakly-ionized plasma proximate to the cathode. A power supply produces an electric field in a gap between the anode and the cathode. The electric field generates excited atoms in the weakly-ionized plasma and generates secondary electrons from the cathode. The secondary electrons ionize the excited atoms, thereby creating a strongly-ionized plasma. A voltage supply applies a bias voltage to a substrate that is positioned proximate to the cathode that causes ions in the plurality of ions to impact a surface of the substrate in a manner that causes etching of the surface of the substrate.

Figures